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May 6, 1997

Mr. William J. Greim
ATSDR - DHAC
1600 Clifton Rd. N.E.
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Atlanta, GA 30333

Dear Bill:

Attached is a draft health consultation regarding consumption of King Mackerel from the Texas Gulf Coast. This consultation was requested by the Department's Seafood Safety Division. We have provided that Division a copy for their convenience. Please let us know when you have completed your certification process.

Sincerely,

signed

Nancy B. Ingram
Public Health Technician
Health Risk Assessment and Toxicology Program

Attachment

TEXAS DEPARTMENT OF HEALTH
Austin Texas
INTER-AGENCY MEMORANDUM

TO: Kirk Wiles, R.S., Assistant Director
Seafood Safety Division

THRU: Judy Henry, M.S., Acting Director
Division of Noncommunicable Disease Epidemiology & Toxicology

THRU: John F. Villanacci, Ph.D., Director
Health Risk Assessment and Toxicology Program

FROM: Lisa R. Williams, M.S., Toxicologist
Health Risk Assessment and Toxicology Program

DATE: April 30, 1997

SUBJECT: Health consultation for consumption of King Mackerel from the Texas Gulf Coast

Attached is the draft health consultation you requested to evaluate the potential health effects associated with consumption of mercury contaminated King Mackerel from the Texas Gulf Coast. This document has been forwarded to the Agency for Toxic Substances and Disease Registry for their certification. When we receive the certified document, we will provide a copy to you for your records.

HEALTH CONSULTATION

TEXAS GULF COAST KING MACKEREL

April 30, 1997

Prepared by

Texas Department of Health
Under Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

BACKGROUND AND STATEMENT OF ISSUES

The Texas Department of Health Seafood Safety Division (SSD) asked the Health Risk Assessment and Toxicology Program to evaluate the potential health risks associated with consumption of King Mackerel taken from the Texas Gulf Coast. King Mackerel are Gulf fish targeted by many recreational fishers. The Texas Department of Health became concerned about mercury in King Mackerel after Florida issued a consumption advisory for this species near the Florida Gulf Coast. The Florida advisory was issued on June 4, 1996, by the Department of Health and Rehabilitative Services. King Mackerel migrate into the waters of the Texas Gulf Coast from Spring to Fall from Florida and Mexico. The Florida advisory recommended a consumption limit for king mackerel in the 33-39" range of one meal per week for adults and one meal per month for women of childbearing age and children; and no consumption was recommended for King Mackerel over 39". A consumption limit was not recommended for King Mackerel under 33 inches. Subsequent to this advisory, other Gulf states have issued similar advisories for their coastal waters.

DISCUSSION

King Mackerel, *Scomberomorus cavalla*, also known as King or Kingfish, are voracious carnivores that feed on almost any available food. They are migrant fish found in areas off the Texas coast and are most abundant from Spring through the Fall. Fishing for King Mackerel, highly popular with recreational fishers, is conducted both from privately owned boats and from party boats which operate out of various ports along the Texas coast. The Texas Parks and Wildlife Department (TPWD) conducts annual surveys to monitor landings of different species by sport-boat anglers in the Gulf of Mexico [1]. In the latest year for which published data are available (1991-1992), King Mackerel was the most abundantly landed species, comprising 36% of all landings from the Texas Territorial Sea (surf line to 15.7 km offshore). King Mackerel represented 52% of all the fish landed by party boats. From 1983 to 1992, the annual average length of King Mackerel caught by private boats ranged from 37.2 to 39.9 inches. The annual average weight ranged from 13.63 pounds to 22.36 pounds; however, larger specimens can range from 30 to 50 pounds. Based on these live weights, SSD has estimated that the average individual King Mackerel would produce 4.72 to 7.82 pounds of fillets.

Commercial harvest has been increasing off the Texas coast during the period from 1992-1995. TPWD estimates that for 1995, 172,500 pounds were harvested commercially from Texas waters [2]. Because of this, there is increased concern for consumption of fish purchased from on-shore local fish markets.

In summary, King Mackerel are a very popular species pursued from all Texas ports by sport-fishers. It is certainly the most frequently caught fish in Gulf waters from Spring through early Fall. The large size compared to other often caught offshore species combined with the easy accessibility from Gulf waters pose a potential for high ingestion rates for the recreational fishers who frequently fish the Gulf of Mexico off the Texas coast. The ingestion rates will be most significant for frequent fishers who store King Mackerel in the freezer and consume the supply regularly over the course of the year.

The Texas Department of Health (TDH) collected 55 individual King Mackerel to determine the mercury concentration in this species of fish. These fish were caught offshore from Galveston, Freeport, Port O'Connor and Port Aransas; all ports where recreational fishers pursue King Mackerel. In general, we found that the larger the fish the greater the concentration of mercury in the tissue (Table 1, Figure 1).

There were no significant differences in mercury concentrations between King Mackerel caught in the Galveston/Freeport area or the Port O'Conner/Port Aransas area. The average mercury concentration for both areas was 0.68 ppm. The levels of mercury in Florida Gulf Coast King Mackerel were less than 0.5 ppm for fish less than 33", 0.5 to 1.5 ppm for fish from 33" to 39", and greater than 1.5 ppm for fish greater than 39".

TABLE 1 Summary of Results of Mercury in Gulf Coast King Mackerel				
	# samples	Size Range	Concentration Range (ppm)	Mercury Concentration (ppm)
Under 39"	41	28-39"	0.267-0.976	0.576
Over 39"	14	39-50"	0.652-1.67	1.00
All data	55	28-50"	0.267-1.67	0.685

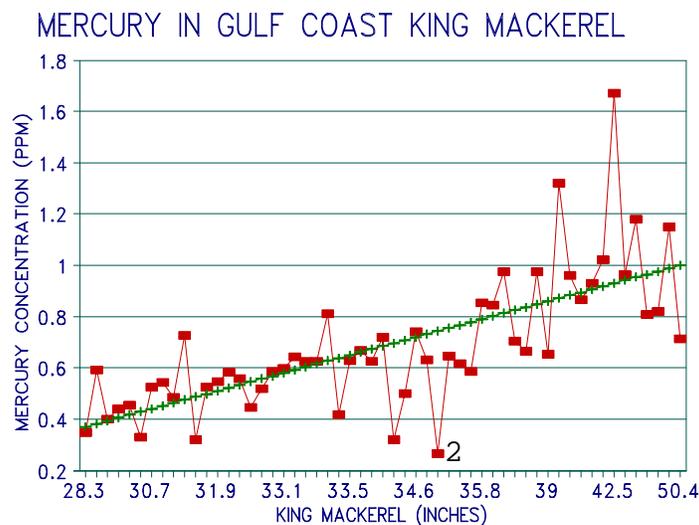


Fig. 1
 $r^2=0.47$

Methylmercury Toxicity

Mercury is a naturally occurring element found throughout the environment in several forms. The mercury in air, water, and soil is predominantly found in the inorganic form. Inorganic mercury released to water can be converted to methylmercury under certain conditions, and taken up by fish. The concentration of mercury is generally higher in older and larger predatory fish.

The neurological effects of methylmercury ingestion have been well documented in humans. Clinical manifestations in adults include tingling of the skin, incoordination, difficulty with speech and hearing, tremor, memory loss, and depression. Chronic exposure may result in permanent central nervous system damage. Young children and fetuses are especially at risk for methylmercury poisoning. It can be carried to an infant through breast milk or to the fetus through placental transfer. Neurological effects in children may range from delayed mental and physical development to a severe syndrome similar to cerebral palsy, depending on the extent of exposure.

Toxicological Evaluation

A reference dose of 0.0003 mg/kg/day and an average body weight of 70 kg was used to calculate an upper limit of consumption for the most sensitive subpopulation, women of childbearing age. For an average female, chronic exposure to mercury at a dose equal to the reference dose would result in a maternal hair level of approximately 4 to 5 ppm mercury. This provides a 2 to 4 fold margin of safety below the lowest observable adverse effects level (LOAEL) for fetal effects.

The data were analyzed according to a 39" size limit since this was the length at which the fish consistently contained elevated levels of mercury (approximately 1 ppm); and to determine whether there were consistencies with the Florida advisory. A person consuming approximately three (3) eight ounce meals per month of Texas Gulf Coast King Mackerel over 39" would exceed the reference dose. We estimate that at this dose the excess risk over background for developmental effects, such as late walking, for infants exposed prenatally is less than five percent. A consumption level of approximately five (5) eight ounce meals per month of Texas Gulf Coast King Mackerel under 39" would be required to exceed the reference dose. Considering the average concentration of all 55 Texas Gulf Coast King Mackerel, a consumption level of four (4) meals per month would exceed the reference dose. Based on the estimate that the average individual King Mackerel would produce between 4-8 pounds of fillets, the number of eight ounce meals from one King Mackerel is approximately 9-16 meals.

CONCLUSIONS

1. The 55 King Mackerel collected from the Texas Gulf Coast contained an average level of 0.68 ppm mercury. Fish under 39" contained an average level of 0.57 ppm; and fish over 39" contained an average level of 1.0 ppm mercury.
2. A consumption level of three (3) eight ounce meals of King Mackerel over 39" would exceed the reference dose.
3. A consumption level of five (5) eight ounce meals of King Mackerel under 39" would exceed the reference dose.
4. A consumption level of four (4) eight ounce meals of King Mackerel in the 28-50" size range evaluated would exceed the reference dose.

RECOMMENDATIONS

1. A fish consumption advisory for King Mackerel from the Texas Gulf Coast should be considered; particularly for fish over 39".

REFERENCES

1. Warren, A.T., L.M. Green, and K.W. Spiller, 1994. Trends in finfish landing of sport-boat anglers in Texas marine waters May 1974 - May 1992. Texas Parks and Wildlife Department, Fisheries Wildlife Division. Austin, Texas.
2. Robinson, L., P. Campbell, and L. Butler, 1996. Trends in Texas Fisheries landings, 1972-1995. Texas Parks and Wildlife Department, Coastal Fisheries Division. Austin, Texas.



PREPARERS OF THE REPORT

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CERTIFICATION

This Health Consultation was prepared by the Texas Department of Health under the a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the Health Consultation was initiated.

Technical Project Officer, SPS, RPB, DHAC

The Division of Health Assessment and Consultation, ATSDR, has reviewed this Health Consultation and concurs with its findings.

Director, DHAC, ATSDR

APPENDIX

TABLE 2. MERCURY IN GULF OF MEXICO KING MACKEREL

SAMPLE #	(LENGTH, inches)	CONCENTRATION (ppm)
POA-1	28.3	0.349
POA-5	28.3	0.592
FRO-19	29.9	0.400
POA-7	29.9	0.439
POO-4	29.9	0.454
POO-7	30.3	0.331
GAO-7	30.7	0.525
GAO-8	30.7	0.543
POA-2	31.5	0.486
POA-3	31.5	0.725
FRO-3	31.5	0.320
FRO-10	31.5	0.525
FRO-9	31.9	0.547
FRO-12	31.9	0.584
FRO-15	32.5	0.559
POO-6	32.5	0.444
GAO-9	32.7	0.520
POO-17	33.1	0.586
FRO-16	33.1	0.599
FRO-18	33.1	0.642
FRO-14	33.5	0.624
FRO-11	33.5	0.626
POA-6	33.5	0.812
POO-8	33.5	0.418
GAO-3	33.5	0.628

TABLE 2. (Cont.) MERCURY IN GULF OF MEXICO KING MACKEREL		
SAMPLE #	(LENGTH, inches)	CONCENTRATION (ppm)
GAO-1	33.8	0.669
FRO-17	33.8	0.625
POO-19	34.25	0.719
FRO-6	34.6	0.321
FRO-13	34.6	0.500
GAO-4	34.6	0.742
POO-10	34.6	0.632
POO-15	35	0.267
POO-13	35	0.648
FRO-5	35	0.615
FRO-7	35	0.585
FRO-8	35.8	0.854
FRO-2	35.8	0.844
POO-11	36.2	0.976
FRO-4	38.6	0.703
POO-5	38.6	0.666
POO-9	39	0.976
POO-14	39	0.652
FRO-1	39	1.32
POO-18	39.4	0.960
POA-4	40.2	0.866
POO-16	41.3	0.931
FRO-20	42.1	1.02
GAO-2	42.5	1.67
GAO-6	44.1	0.964

POO-12	45.3	1.18
POO-2	45.7	0.809
POO-3	46.5	0.820
POO-1	50.4	1.15
GAO-5	50.4	0.715

A-2

TABLE 3 Metals in Gulf Coast King Mackerel	
METALS:	King Mackerel 50.4"
	Concentration (ppm)
Arsenic	<0.634
Cadmium	<0.00456
Copper	<0.320
Lead	<0.0189
Selenium	0.595
Zinc	3.28

